

B. Mary Minerva McCroskey Memorial State Park

Date: Jul. 31, 1998	Stand #: Association			
SHRUBS	1: Agsp-Feid	2: Agsp-Pose	3: Feid-Fesc	4: Pipo-Syal
<i>Erigonum heracleoides</i>	1	1	1	2
<i>Spiraea betulifolia</i>	2	0	2	1
<i>Phlox sp.</i>	1	0	1	3
<i>Symphoricarpos albus</i>				
PERENNIAL GRAMINIDS				
<i>Agropyron spicatum</i>	1	3	1	1
<i>Festuca idahoensis</i>	3	0	2	0
<i>Festuca scabrella</i>	0	0	2	0
<i>Poa secunda</i>	1	1	1	1
PERENNIAL FORBS				
<i>Achillea millefolium</i>	1	1	1	1
<i>Arenaria capillaris</i>	1	0	1	0
<i>Balsamorhiza sagittata</i>	3	2	2	2
<i>Lomatium sp.</i>	1	1	2	0
<i>Silene sp.</i>	0	0	1	0
ANNUALS AND BIENNIALS				
<i>Alyssum alyssoides</i>	0	0	0	1
<i>Arenaria serpyllifolia</i>	0	0	0	1
<i>Bromus sp.</i>	0	1	0	2
<i>Collomia sp.</i>	0	0	0	1
<i>Epilobium brachycarpum</i>	0	0	0	1
<i>Lactuca serriola</i>	0	1	0	0
<i>Polygonum majus</i>	0	0	0	1
<i>Tragopogon sp.</i>	0	1	0	1
<i>Ventenata dubia</i>	1	2	0	3
<i>Vicia villosa</i>	0	0	0	1

C. Wawawai Road

Date: Aug. 3, 1998	Stand #: Association
SHRUBS	1: Rosa phase
<i>Rosa woodsii</i>	3
PERENNIAL FORBS	
<i>Anthriscus caucalis</i>	1
<i>Hiericum perforatum</i>	2

Table 11. Continued.

D. Spaulding Road

Date: Aug. 4, 1998	Stand #: Association
SHRUBS	1: Feid/Syal
<i>Rosa woodii/nuttana</i>	1
<i>Symphoricarpos albus</i>	2
PERENNIAL GRAMINIDS	
<i>Agropyron spicatum</i>	3
<i>Koeleria cristata</i>	1
<i>Poa pratensis</i>	1
PERENNIAL FORBS	
<i>Achillea millefolium</i>	1
<i>Anthriscus caucalis</i>	3
<i>Balsamorhiza saginata</i>	2
<i>Frasera albicaulis</i>	1
<i>Galium boreale</i>	1
<i>Geranium viscosissimum</i>	2
<i>Haplopappus liatrisformis</i>	1
<i>Hieracium albertinum</i>	1
<i>Hypericum perforatum</i>	1
<i>Iris missouriensis</i>	2
<i>Lithospermum ruderaie</i>	2
<i>Lomatium sp.</i>	1
<i>Lupinus sericeus</i>	1
ANNUALS	
<i>Agrostis interrupta</i>	1
<i>Bromus japonicus</i>	1
<i>Lactuca serriola</i>	1

E. Knotgrass Road

Aug. 14, 1998	Stand #: Association		
	1. Agsp-Pose	2. Agsp-Pose	3. Arri/Pose
SHRUBS		highly disturbed	
<i>Artemisia rigida</i>	0	0	1
<i>Chrysothamnus nauseosus</i>	1	2	2
PERENNIAL GRAMINIDS			
<i>Agropyron spicatum</i>	1	0	1
<i>Poa secunda</i>	1	1	1
PERENNIAL SHRUBS			
<i>Achillea millefolium</i>	2	2	1
<i>Hypericum perforatum</i>	1	0	0
<i>Helianthus annuus</i>	1	1	0
ANNUALS			
<i>Bromus sp.</i>	3	3	1
<i>Epilobium brachycarpum</i>	1	1	0
<i>Euphorbia sp.</i>	1	1	0
<i>Lactuca serriola</i>	1	0	0
<i>Lagophylla ramosissima</i>	1	1	0
<i>Sisymbrium altissimum</i>	1	0	0
<i>Verbascum blattaria</i>	1	0	0

Table 11. Continued.

F. Chief Joseph Wildlife Area

Aug. 17, 1998	Stand #: Association		
	Agsp-Feid	Agsp-Pose	Agsp-Feid
SHRUBS		highly disturbed	
<i>Phlox sp.</i>	0	0	1
PERENNIAL GRAMINOIDS			
<i>Agropyron spicatum</i>	4	1	1
<i>Festuca idahoensis</i>	0	0	1
<i>Poa secunda</i>	0	0	1
<i>Sitanion hystrix</i>	0	1	0
PERENNIAL FORBS			
<i>Achillea millefolium</i>	1	0	1
<i>Apocynum cannabinum</i>	1	1	0
<i>Arenaria capillaris</i>	0	0	1
<i>Centaurea solstitialis</i>	0	5	0
<i>Cirsium undulatum</i>	0	1	0
<i>Epilobium brachycarpum</i>	1	0	0
<i>Grindelia squarrosa</i> var. <i>squarrosa</i>	0	1	0
<i>Helianthella uniflora</i>	0	1	0
<i>Hypericum perforatum</i>	1	1	1
<i>Lithospermum ruderale</i>	1	0	0
<i>Lupinus sp.</i>	1	0	1
ANNUALS			
<i>Agrostis interrupta</i>	1	0	0
<i>Alyssum alyssoides</i>	1	1	0
<i>Amsinckia sp.</i>	0	0	1
<i>Bromus japonicus</i>	1	0	1
<i>Lactuca serriola</i>	1	0	1
<i>Madia sp.</i>	0	0	1

Table 11. Continued.

1933	1979	1998
<i>Anthemis arvensis</i>	<i>Alyssum alyssoides</i>	<i>Agrostis interrupta</i>
<i>Bromus brizaeformis</i>	<i>Anthemis cotula</i>	<i>Anthriscus caucalis</i>
<i>Bromus hordeaceus</i> [=mollis]	<i>Bromus japonicus</i>	<i>Aquilegia</i> sp. (cultivar)
<i>Bromus tectorum</i>	<i>Capsella bursa-pastoris</i>	<i>Arctium minus</i>
<i>Cerastium vulgatum</i>	<i>Cerastium tomentosum</i>	<i>Artemisia absinthium</i>
<i>Cirsium lanceolatum</i> [=vulgare]	<i>Dactylis glomerata</i>	<i>Asperugo procumbens</i>
<i>Draba verna</i>	<i>Digitalis purpurea</i>	<i>Bryonia alba</i>
<i>Erodium cicutarium</i>	<i>Dipsacus sylvestris</i>	<i>Campanula rapunculoides</i>
<i>Malva rotundifolia</i> [=neglecta]	<i>Elymus caput-medusae</i>	<i>Centaurea solstitialis</i>
<i>Marrubium vulgare</i>	<i>Hypericum perforatum</i>	<i>Chrysanthemum leucanthemum</i>
<i>Nepeta cataria</i>	<i>Myosotis micrantha</i>	<i>Cirsium arvense</i>
<i>Rumex acetosella</i>	<i>Phleum pratense</i>	<i>Convolvulus arvensis</i>
<i>Sisymbrium altissimum</i>	<i>Plantago major</i>	<i>Cynoglossum officinale</i>
<i>Spergularia rubra</i>	<i>Poa bulbosa</i>	<i>Hesperis matronalis</i>
<i>Thlaspi arvense</i>	<i>Poa pratensis</i>	<i>Lactuca serriola</i>
<i>Valerianella macrocera</i>	<i>Polygonum convolvulus</i>	<i>Linaria dalmatica</i>
<i>Verbascum thapsus</i>	<i>Stellaria media</i>	<i>Lithospermum arvense</i>
	<i>Tanacetum vulgare</i>	<i>Papaver argemone</i>
	<i>Taraxacum officinale</i>	<i>Phleum pratense</i>
	<i>Tragopogon dubius</i>	<i>Plantago lanceolata</i>
	<i>Trifolium hybridum</i>	<i>Plantago major</i>
	<i>Trifolium repens</i>	<i>Sonchus asper</i>
	<i>Vicia villosa</i>	<i>Ventenata dubia</i>
		<i>Veronica officianalis</i>

Table 12. Non-native vascular plant taxa first reported at Kamiak Butte in 1933, 1979, and 1998. Based on data in Mullen (1933), Fiely (1979), and J. Roberts and J. Croft, personal communications. Note that rate at which new alien taxa being discovered at Kamiak Butte has shown no tendency to level off.

Monitoring

A major consideration in selecting the procedure we used to sample vegetation along our monitoring transects was the fact that we sought to repeat as precisely as possible the methods used by Daubenmire (1970), so that our results could be compared to his in order to assess changes in vegetation over a time scale of several decades. This method—recording all vascular plant taxa in small subplots spaced at 0.5-m or 1.0-m intervals along 20-m or 25-m transects—has both advantages and disadvantages. Its advantages are that it provides very detailed information on community composition along the transect and can be repeated periodically to obtain precise information on changes in community composition. Its disadvantages are that it is very time-consuming and provides information over only a very small area. We recommend that sampling along the monitoring transects be repeated at 5-year or 10-year intervals to track changes in community composition and that this be combined with photomonitoring to provide information on changes over a larger spatial scale. Repeated sampling along the monitoring transects at shorter intervals is unlikely to justify the effort that would be required.

Stewardship

It is clear that exotic species are a serious threat to Palouse Grassland and Canyon Grassland remnants. Further studies should be conducted to assess the effectiveness of different practices for minimizing this threat. Field studies in 1999 should focus on the five monitored sites for three reasons: 1) we have good baseline data for these sites; 2) the owners of these sites are supportive of this study, 3) the five sites all contain at least some areas with native vegetation in moderately good condition but are threatened to varying degrees by non-native species, so they present an excellent opportunity to study methods of protecting and restoring native grasslands. Experiments should be set up to test the effectiveness of a variety of treatments to control non-native species (e.g., herbicide application, hand-weeding) and to restore native vegetation (e.g., inoculation with soil microorganisms). The latter approach is particularly promising because in prairie soils, microorganisms affect soil structure, stability, and nutrient status and enhance seedling establishment. Consequently, they are extremely important in the restoration of disturbed steppe communities (Dhillon and Friese 1992; Belnap 1993, 1994).